

Appendix A2.

**FACILITY CONDITION ASSESSMENT
METHODOLOGY AND GLOSSARY**

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A) Assessment Methodology and Cost Adjustment Factors

Condition Assessment & Space Adequacy Study

In April, 2006, the Kentucky Council on Postsecondary Education (CPE) contracted with VFA, Inc. to provide a study of the condition and educational adequacy of selected assets at the nine Kentucky Public Postsecondary Education Institutions. The study includes estimating the timing and costs of major system renewal events for each assessed asset through VFA's "Level 1, Lifecycle Condition Assessment" process. The study also includes assessing the space needs, educational adequacy and fit-for-continued use of selected assets at each Institution, and providing an analysis of funding options. This appendix documents the methodology followed to collect data for the condition assessment portion of the project for CPE and the appropriate Institution.

The Level 1 Lifecycle Condition Assessment

VFA's Level 1 Lifecycle Condition Assessment (LCA) is designed to provide building owners with a quick and cost effective estimate of the major system capital renewal events for assets in their portfolio. The Level 1 LCA includes profiling all the major component systems in a building (or other asset, such as utility infrastructure) to answer the following questions:

- What is the overall condition of the facility?
- For each building system, what type of construction (e.g. what kind of roof) is it?
- How old is it?
- How many years remaining until renewal is due?
- How much will it cost to renew?

The Level 1 LCA is intended for budgeting purposes only, and is not intended to provide construction specification-grade information about an asset, nor does it provide a list or cost estimates of individual deficient conditions within an asset. Detailing deficiencies and corrective actions is a service available in VFA's Level 2 Detailed Facility Condition Assessment.

LCA Preparation with CPE

The Level 1 LCA consists of a sophisticated process and methodology supported by expert opinion of facilities engineers and architects along with VFA's web-based software application, VFA.facility. To begin the process with the Kentucky Council on Postsecondary Education (CPE), the VFA project team conducted a commencement meeting with the Postsecondary Education (PE) team on May 10, 2006, at Kentucky State University. The VFA team consisted of the Project Director, two Project Managers, an Architect, an Electrical engineer and a Mechanical engineer. The PE team consisted of members of each public postsecondary educational institution and general representatives of CPE. The purpose of the commencement meeting was threefold: (1) to initiate the project, (2) to conduct a pilot assessment, and (3) to calibrate the process. VFA presented the LCA methodology and the PE team members had the opportunity to ask questions and request clarification. The assessment team then led a hands-on pilot assessment of one of the buildings on the assessment list at KSU. Members of the PE team accompanied the VFA team on the pilot assessment and saw firsthand how an assessment is conducted. Following the pilot field assessment, a question and answer session was held. The questions enabled VFA to better understand the needs of the Council and the Institutions. Following the meeting a draft pilot

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report was issued to the Council illustrating the results and findings of the pilot assessment. The general format for presenting condition data was acceptable to the Council.

Assets Included in the Study and this Report

In the Master Contract, CPE provided VFA with a Master List (dated July 1, 2006) of assets to be included in the condition study. Some modifications to the Master List were made between then and the publication of this draft report, including:

1. Addition of site utility elements, as applicable and confirmed with campus Facility Managers by VFA project management and field team(s).
2. Additions/deletions to the building list by Institution Facility Managers, as communicated to VFA project management and field team(s).
3. Deletion of buildings < 5 years old from the “normal” Level 1 LCA process. CPE requested that identified buildings < 5 years old (those on the original Master List and additional buildings supplied by CPE) be included in the overall study through a modeling exercise that includes creating asset records based on interviews with and information supplied by campus Facility Managers only (and not walking each of these buildings during field assessments).

LCA Methodology

The Level 1 Life Cycle Assessment methodology is a process where the systems within a building are evaluated for their age, condition and cost. The systems are evaluated individually and the aggregated results enable a data-driven understanding of building condition, system replacement timing and capital expenditure needs over a given period of time. A fifteen year outlook was used for Kentucky.

The process begins with an on-site kick-off meeting at each campus with VFA’s project team and members of the PE team at the institution being assessed. The participants collaborate to enable the VFA team to learn about specific system issues within each of the buildings to be assessed. The PE team had the opportunity to ask additional questions of the VFA team.

Following the kick-off meeting the team conducts a walk-through of each building and infrastructure element to evaluate the systems. The Architect evaluates the exterior systems, interior finishes and overall structure. The Electrical Engineer evaluates the main electrical service and distribution, branch circuitry, lighting, emergency power, fire alarm and communications systems. The Mechanical Engineer evaluates the heating, ventilating and air conditioning (HVAC), plumbing and fire protections systems.

For each system, specific information is gathered, including date installed, type, capacity, effective age and overall operational condition. The systems are categorized according to the National Institute of Standards & Technology Uniformat II standards. The team records the information while in the field so that it can be referenced in the next phase of the methodology: data entry and cost analysis.

During data entry and cost analysis, the team reviews the information gathered in the field and compiles and formats the data into a building “system model.” This information is recorded in the VFA software, *VFA.facility*. A separate system model record is created for each building system. The system records consist of a generic description of the system, the date installed, actual or estimated age, expected lifetime, years remaining in lifetime, system quantity or capacity, replacement cost and renewal cost. The system costs are generated from VFA’s comprehensive system templates which use integrated RS Means cost estimating assemblies and line items. The baseline RS Means costs are adjusted for each campus location by assigning one of the RS Means City Cost Indexes to account for localized material and labor rates. System lifetimes are based on BOMA 2003 lifecycle standards.

System records are based on templates intended to generally identify the type of construction comprising each system and provide reasonable estimates for replacement and renewal costs for that type of system in that asset. Because templates are used, detailed line items (visible on detail screens in the software, but not shown in the printed reports presented here) supporting the overall system replacement cost are not construction-specification-grade information and may not correspond exactly to what physically exists in the asset, but the overall estimates should suffice for budgeting purposes.

Once completed, the system records, in aggregate, comprise a system model for each building. The system model in the software enables a data-driven understanding of building condition, system replacement timing and capital expenditure needs over a given period of time.

In addition, the system replacement costs are summed to calculate an asset replacement value for the building. The replacement value becomes an important input to the building's Facility Condition Index (FCI), a key benchmark indicator which quantifies the condition of the building.

The FCI is calculated by dividing the sum of the near term system replacement costs by the replacement value of the building. The near-term replacement costs are the sum of the system replacement costs for those systems that will reach the end of their projected life during the next fiscal year. The resulting fraction represents the portion of the building's replacement value that needs to be replaced or renewed within the next year and is an indicator of condition

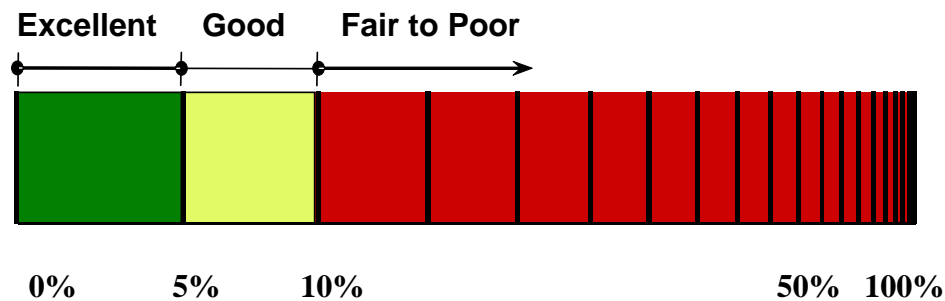
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$$\text{FCI} = \frac{\sum \text{Near-Term System Replacement Costs}}{\text{Asset Replacement Value}}$$

The lower the FCI, the better the overall condition of the building. Buildings with FCIs of 5% or lower are generally regarded as in excellent condition; 5% to 10% as good

condition, and anything over 10% as fair to poor condition. FCIs over 60% represent extreme needs, where extensive renovation or demolition might be considered.

Common FCI Standards



Lifecycle and Cost Estimate Validation

As with any estimating process it is necessary to conduct diligent evaluation of the input and output of the estimated values. For the Kentucky PE project, both lifecycle estimates (expected useful lifespan of each component system) and cost estimates were verified and validated based on industry standards and historical information provided by the Council.

The lifecycle information published by the Building Owners and Managers Association (“Building System Useful Life”, BOMA International (c) 2003) is a widely accepted standard for system lifecycles. Since the information is industry average for all buildings, an effort was made to determine if any adjustments needed to be made based on the application to higher education. Between July 28, 2006 and August 15, 2006, VFA held discussions with members of the PE team and the Association of Higher Education Facilities Officers (APPA) to determine if the BOMA standard was applicable. It was agreed that the standard is sufficient for use without adjustment.

The RS Means cost estimates were evaluated for accuracy compared to historical cost information provided by Kentucky Institutions. It was determined that the raw cost data contained within the system records is low and needs to be adjusted. The adjustments are a result of two reasons:

1. **Design & Contingency Adjustment:** The RS Means data used in the VFA system templates accounts for materials and labor to replace a given system as well as overhead and profit related to the primary contractor (the subcontractor level, e.g. the HVAC contractor for HVAC work). Engineering, design and inspection fees are not included

in the costs. Additionally, no contingency costs are carried. Kentucky Institutions provided VFA with historical project cost data from six Institutions. Analysis of the information provided to VFA showed that each of these components used a percentage multiplier of the raw construction costs.

- a. Engineering, design and inspection:
+10% adjustment
- b. Project contingencies:
+10% adjustment

2. **Kentucky Postsecondary Education Campus Premium:** A premium cost multiplier was also applied to reflect the additional cost of a contractor conducting operations in a higher education campus environment in Kentucky. Baseline RS Means data represents an average of labor and material costs in a given locale. As with all averages the actual data used to calculate the average will fluctuate higher and lower. It has been Kentucky Education Institutions’ experience that work in their campus environments tends to reflect higher costs rather than lower. The reasons for this premium include: compressed work schedules during semester breaks; work in occupied spaces; public safety and security obligations; parking and layout restrictions; system quality; system redundancy; and diligent conformance to codes and standards in the public education environment. These costs can vary by location and system somewhat but in an effort to promote consistency and continuity a single adjustment factor was used for all systems. The results of actual historical costs provided to VFA compared to the estimated costs showed an additional variance of 24%.
 - a. Higher Education Campus Premium: +24% adjustment

The table below illustrates the adjustments made to the costs for a sample 8,000 SF building with a raw building replacement value of \$1,000,000.

Table A2.1. Sample System & Building Replacement Value Adjustments

Item	Percent Adjustment	Cost	Cost/SF
Raw Construction Costs (based on localized RS Means estimates)		\$1,000,000	\$125/sf
Engineering, Inspection and Permitting	+10%	\$ 100,000	
Project Contingencies	+10%	\$ 100,000	
Higher Educational Premium	+24%	\$ 240,000	
Sum of Adjustments	+44%	\$ 440,000	
Adjusted Project Cost		\$1,440,000	\$180/sf

Asset Replacement Value Adjustments

The Replacement Value of each asset is intended to represent the construction costs of replacing an asset in like kind using current technologies. VFA.facility calculates the Replacement Value of each asset by summing up the Replacement Cost of each component system of that asset. This subtotal of basic construction costs can then be adjusted up or down to reflect other factors not included in prior system adjustments.

For the KCPE study, with input from six of the nine Institutions participating, VFA identified two factors that lie outside of the systems costs. They are:

1. **Furniture and Equipment:** Most Higher Ed Institutions include in their building replacement values a budget for furniture and equipment beyond the normal “shell, walls, carpet, lights” move-in-ready (but empty) standard VFA normally uses. The additional furniture and equipment added an average of +25% to the value of each building for which VFA received input.
2. **Site Remediation Issues:** Replacing a building in total usually requires some site preparation work that is not captured in the system profiles. KY Higher Ed Institution’s experience shared with VFA showed an average of an additional +5% of the value of the building should be budgeted for site issues.

These two adjustments are added to the subtotal of the system replacement costs for each asset, to get the final Asset Replacement Cost shown on the Asset Detail page and on the reports presented here.

System Renewal Costs

The Level 1 LCA provides an estimated system replacement cost, a building replacement cost (as the sum of individual system replacement costs), and a system renewal cost. The adjustments discussed to this point have focused on system replacement and building replacement values. System renewal costs differ from system replacement costs, and have additional adjustment factors, for two reasons:

1. When a system reaches the end of its lifecycle it may be replaced in its entirety, such as a roofing system, or it could be renewed by replacing or repairing components, while leaving a portion of the original system intact, like the building’s foundation. A base percent renewed factor is applied to account for some percentage of each system that will be renewed or replaced when the system wears out. This adjustment has the effect of reducing the renewal cost of some systems below their “system replacement value” because they will not be replaced in their entirety.
2. A demolition and disposal adjustment of +25% is applied to every system to identify renewal costs. Demolition and disposal are costs not included in the replacement value (they are not necessary when building a system from scratch, as in new construction), but are necessary when replacing or renewing a system in an existing building.

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The table below illustrates how a percent renewed adjustment is made when projecting the estimated renewal costs.

Table A2.2. Sample Percent Renewed Adjustments

System	Sample Base Replacement Cost	Base “% Renewed”	Demo & Disposal Adjustment	“% Renewed” in VFA facility	Resultant Renewal Cost
A - Substructure/Foundations	\$24,600	5%	+25%	6.25%	\$1,550
B30 - Roofing	\$38,160	100%	+25%	125%	\$47,700
D3040 – Electrical Distribution	\$475,690	75%	+25%	93.75%	\$445,960
D5030 – Communications & Security	\$112,420	85%	+25%	106.25%	\$119,445

In sum, VFA’s Level 1 Lifecycle Condition Assessments of Kentucky Postsecondary Education assets at the nine Institutions provide a consistent means of comparing the system component renewal needs of buildings assessed at each campus. Survey elements, data collection methods and cost estimating adjustments have all been tuned to meet the specific needs of PE current facilities condition and space utilization project.

B) Glossary of Terms

Adjustment Factor

A multiplier assigned to a system to account for additional costs due to design, inspection and educational premiums. The adjustment factor is multiplied against the sum of the construction line items to get the total system replacement cost.

Asset

A free-standing structure, a portion of a structure, or any part of facility infrastructure that is distinguishable from its surroundings by date of construction, construction type, and/or the systems that serve it.

Asset Type

The role that the asset has in the facility. For example, an asset can be a building, a utility, or an outdoor structure. The Asset Type field allows the asset record to be customized to capture information about a variety of buildings and infrastructure that can exist in a facility.

Backlog

Identified maintenance or renewal of asset systems that is due in the current fiscal year or in the past.

Building Condition Codes

A qualitative classification based on APPA standards, assigned to each facility to describe the overall building condition. Condition Codes are based on the amount of work needed in a particular facility, as represented by renovation dollars required or the facility's FCI. The table below outlines the definitions of each code

Because each facility requires different amounts of work over time, the Building Condition Code can increase the longer the time horizon included in the "needs." VFA has calculated and stored the Building Condition Code for each building two ways:

- (a) Based on a "strict" industry standard definition of FCI (with a time horizon of 1 year, meaning the work due in the current year, plus any backlog already due, is included in the FCI).
- (b) Based on a 5-year outlook, where current backlog, plus current year's needs, plus needs over the coming 5 years, are included in the FCI calculation. The 5-year outlook provides a "forward looking" summary of each asset consistent with many owners' impression of building condition and with near term planning horizons.

Campus

A grouping of assets that is generally adjacent to one another on a contiguous site. A campus is bounded on all sides by property lines, which may or may not correspond to physical features of the site, like roads or bodies of water. Campus is the second level of grouping of assets (under Institutions) in the VFA.facility database.

Campus Code

A unique alphanumeric identifier assigned to each campus of an Institution. This identifier can be changed at any time as long as the new identifier remains unique and is not shared by another campus of the same Institution. Campus Codes in the CPE database were supplied by each Institution.

City Cost Index (CCI)

A factor used to adjust RS Means Construction Data to a specific city. The appropriate CCI can be selected from a list compiled by RS Means

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that includes most major U.S. and Canadian cities.

Commission Date

The date that an asset or system is put into use.

Construction Type

The type of construction relative to structural elements and their fire protection.

CSV

A spreadsheet file. CSV (Comma-Separated Values) files can be opened in Microsoft Excel. Raw data can then be extracted or formatted by the user for easy custom analysis or reporting.

Current Replacement Value (CRV)

The cost required to replace a building or system in kind, determined by summing the replacement values of each system.

Decommission Date

The date that an asset is no longer in active use.

Estimator

The person who estimates the cost of an action for a requirement.

Facility Condition Index (FCI)

An index that measures the relative condition of assets. $FCI = \frac{\text{total value of the systems requiring replacement within the next year}}{\text{current replacement value (CRV) for the asset}}$. Generally, the higher the FCI, the poorer the condition of the facility.

FICE Code

The Federal Interagency Commission on Education number assigned by the US Department of Education as a unique identification number for each Institution.

Fiscal Year

An accounting period lasting 365 days (or 366 days) that does not necessarily mirror the calendar year. In VFA *facility*, forecasts and FCI calculations are reset at the beginning of each fiscal year. Administrators can specify the beginning date of the fiscal year. The fiscal year for the KCPE study has a start date of January 1.

Floor

All the contiguous occupiable space within an asset that shares the same elevation or floor level.

Historical Category

The historical significance of an asset per the National Register of Historic Places or other standard.

Inflation Rate

The rate of increase in the price of goods and services. In VFA *facility*, the annual inflation rate is 4.7% unless it is changed. In this report, an inflation rate of 0.0% was used.

Infrastructure

The common utility or vertical elements and systems that comprise a facility, e.g. common steam supply, roadways or sewer lines. A piece of facility infrastructure is entered into VFA *facility* as an asset. When an asset record is created, the specified asset type identifies the type of infrastructure, and customizes the asset record's fields in order to collect type-appropriate data.

Inspector

The person who observed and investigated an asset, a system or a requirement.

Lifetime

The number of years an asset system is expected to be useful (its *useful life*).

Line Item

A discrete cost in the detailed cost of a system or a requirement. It includes the class, the code, the description, the number of units, the unit of measurement, a cost per unit and a total, which includes Overhead and Profit for the given trade.

List

A list of records in rows and attributes in columns. A record and an attribute intersect in a field, or cell. You can access records by selecting them from the list.

Net Present Value (NPV)

An approach used in capital budgeting that compares the current value of a dollar to the value of that same dollar in the future after discounting. NPV is calculated by removing the accumulated inflation over the funding period.

Region

The first level of division for cataloguing assets in VFA.facility. For the Kentucky Postsecondary Education database, Regions are labeled “Institutions” and Institutions are divided into Campuses.

Record

A collection of data about a facility. It contains all the information for an item, such as a campus or asset.

Renewal Cost

The cost of replacing an asset system as it reaches or exceeds the end of its useful life.

Replacement Cost

The current cost of replacing an asset, a set of assets or an entire campus in total dollars adjusted annually for inflation.

Requirement Index (RI)

Similar to the FCI, the Requirement Index is a ratio indicating the relative condition of an asset. The RI = the sum of the cost of ALL requirements for an asset (not just those due in the next fiscal year), divided by the replacement cost of the asset. In a Level 1 assessment, no requirements are identified (only system renewal events), so the RI should = the FCI for Level 1 assets. The RI is not relevant to Level 1 data and is not presented in these draft reports.

Resource

The appropriate type of labor [“Standard” (= union), open shop, etc.] for a specific campus. The labor rates for each RSMeans line item within an action are affected by the Resource type selected.

RSMeans CCI

See *City Cost Index*.

Size

The gross area of an asset in the appropriate unit of measurement. For buildings, size is indicated in square feet. The accuracy of the size calculation affects the asset's replacement value.

System

An assembly, finish, fixture, piece of equipment, or other component that makes up an asset. Also called a *component*.

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System Model

The relevant cost information for each system in an asset. In a system model, each asset system is identified along with its projected lifetime in years, the cost, the cost as a % of CRV, and the % renewed at the end of its lifetime. System models calculate an asset's cost per unit of measurement, which determines the CRV.

System Renewal

The replacement or partial repair of an asset system as it reaches or exceeds the end of its useful life, thereby beginning a new lifecycle for that system.

Uniformat 2 Categories

Four levels of classifications of asset systems.

Unit of Measurement

The method in which an asset's size is measured. For buildings, unit of measure = square feet.

Years Remaining

The number of years of a system's useful service life that are projected to be remaining at the time of inspection. Years Remaining is used to calculate the year the next renewal is expected to be required. For example, a 20-year roof installed in 1991 and found to be under normal "wear and tear" during an assessment in 2006, has 5 years remaining and is projected for replacement in 2011.